Connaissance des Tems, to be 0° 28′ 59″ west of Paris; which added to 1° 51′ 18″·73, its east longitude from Greenwich, resulting from the preceding work, gives 2° 30′ 17″·73 for the difference of longitude between Paris and Greenwich; which is equivalent to $9^m\ 21^s{\cdot}18$ in time, differing only $0^s{\cdot}28$ in defect from the results obtained with fire signals as reported in the Phil. Trans. for 1826, by Mr. Herschel. As the accuracy of the preceding work wholly depends upon the degree of reliance that may be placed upon the base at Hounslow Heath, which is somewhat questionable, the author recommends that a new base be measured to connect in the most unexceptionable manner the stations of Leith Hill and Wrotham; to the successful accomplishment of which, the arrangements so happily devised by Colonel Colby for compensating expansion would eminently contribute.

An Appendix is subjoined, containing miscellaneous observations with respect to various objects connected with the proceedings, accompanied with tables relating to the computations. The methods employed for securing the permanence of the positions of the microscopes of the theodolites are pointed out, and the influence of various minute causes of inaccuracy is inquired into, especially that of lateral refraction, which frequently occasioned a sensible variation in the same angles observed in different states of the weather.

The original observations relating to the work are deposited with the Royal Society, for the purpose of being consulted whenever occasion may require. All the angles employed in the work, with the name of the observer, and the manner in which they were derived, are given at the end of the present paper. Tables are also given detailing the observations of the pole star.

On the Phenomena of Volcanoes. *By Sir* Humphry Davy, *Bart. F.R.S.* Read March 20, 1828. [*Phil. Trans.* 1828, *p.* 241.]

In a paper on the Decomposition of the Earths, published in the Philosophical Transactions for 1812, the author offered it as a conjecture that the metals of the alkalies and earths might exist in the interior of the globe, and on being exposed to the action of air and water, give rise to volcanic fire and to the production of lavas; by the slow cooling of which, basaltic and other crystalline rocks might subsequently be formed. Vesuvius, from local circumstances, presents peculiar advantages for investigating the truth of this hypothesis; and of these, the author availed himself during his residence at Naples in the months of December 1819, and of January and February 1820. A small eruption had taken place a few days before he visited the mountain, and a stream of lava was then flowing with considerable activity from an aperture in the mountain a little below the crater, which was throwing up showers of red-hot stones every two or three minutes. On its issuing from the mountain, it was perfectly fluid, and nearly white-hot; its surface appeared to be in violent agitation, from the bursting of numerous bubbles, which emitted clouds of white smoke. There was no appearance of more vivid ignition

in the lava when it was raised and poured out by an iron ladle. A portion was thrown into a glass bottle, which was then closed with a ground stopper; and on examining the air in the bottle some time afterwards, it was found not to have lost any of its oxygen. Nitre thrown upon the surface of the lava did not produce such an increase of ignition as would have attended the presence of combustible matter. The gas disengaged from the lava, proved on examination to be common air. When the white vapours were condensed on a cold tin plate, the deposit was found to consist of very pure common salt; and the vapours themselves contained 9 per cent. of oxygen, the rest being azote, without any notable proportion of carbonic acid or sulphurous acid gases; although the fumes of this latter gas were exceedingly pungent in the smoke from the crater of the volcano. On another occasion the author examined the saline incrustations on the rocks near the ancient bocca of Vesuvius, and found them to consist principally of common salt, with some chloride of iron, a little sulphate of soda, a still smaller quantity of sulphate or muriate of potassa, and a minute portion of oxide of copper. In one instance in which the crystals had a purplish tint, a trace of muriate of cobalt was detected. From the observations made by the author at different periods, he concludes that the dense white smoke which rose in immense columns from the stream of lava, and which reflected the morning and evening light of the purest tints of red and orange, was produced by the salts which were sublimed with the steam. It presented a striking contrast to the black smoke, arising from the crater, which was loaded with earthy particles, and which in the night were highly luminous at the moment of the explosion. The phenomena observed by the author afford a sufficient refutation of all the ancient hypotheses, in which volcanic fires were ascribed to such chemical causes as the combustion of mineral coal or the action of sulphur upon iron, and are perfectly consistent with the supposition of their depending upon the oxidation of the metals of the earths upon an extensive scale in immense subterranean cavities, to which water, or atmospheric air, may occasionally have access. The subterranean thunder heard at great distances under Vesuvius, prior to an eruption, indicates the vast extent of these cavities; and the existence of a subterranean communication between the Solfaterra and Vesuvius is established by the fact, that whenever the latter is in an active state, the former is comparatively tranquil. In confirmation of these views, the author remarks that almost all the volcanoes of considerable magnitude in the old world are in the vicinity of the sea: and in those where the sea is more distant, as in the volcanoes of South America, the water may be supplied from great subterranean lakes; for Humboldt states that some of these throw up quantities of fish. The author acknowledges, however, that the hypothesis of the nucleus of the globe being composed of matter liquefied by heat, offers a still more simple solution of the phenomena of volcanic fires.